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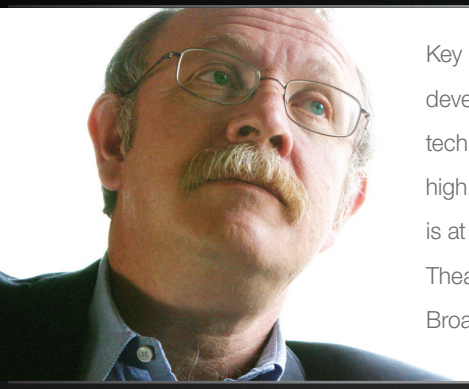
Rev 0 – Aug 2012



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KD-HD8X8

8 Inputs to 8 Outputs HDMI/DVI Matrix Switcher

Setup Guide

Key digital®

The Experts in Digital Video Technology and Solutions™

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About KD-HD8X8

Description

- Key Digital's Digital IQ Series™ KD-HD8X8 is an HDMI Matrix switcher capable of switching 8 independent Inputs/Sources to 8 independent Outputs/Zones. Built-in fully matrixed Serial IR/RS-232 routing is also available to remotely control your displays.

Key Features

- Full switching of 2 independent matrixes: HDMI Audio/Video, one-directional IR/RS-232 Tx to Rx
- Supports all SD, HD, and VESA (VGA, SVGA, XGA, WXGA, SXGA, UXGA) resolutions up to 1080p (60Hz & 50Hz)
  - **SD & HD:** 480i, 480p, 720p, 1080i, 1080p
  - **VESA:** From 640x480p up to 1920x1200p
- Supports lossless compressed digital audio:
  - Dolby® TrueHD, Dolby® Digital Plus and DTS™-HD Master Audio
- Internal EDID Library features 12 default EDID configurations, in addition to Native EDID data for any Output/Display
- Full Buffer Technology (FBT™) dynamic signal re-clocking
- Advanced HDMI® Features: **3D Ready, 4K Resolution Support, Audio Return Channel**
- Power Saving Mode: can shutdown unused outputs to conserve power.

Key Benefits

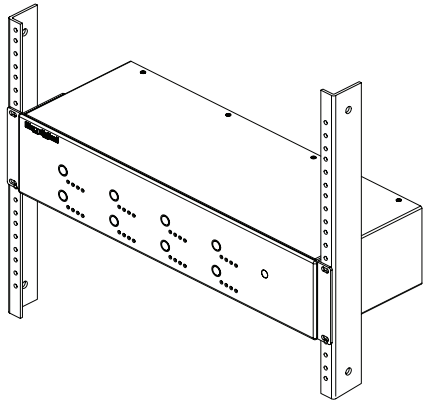
- Video, Audio and Control distribution via Champion Series™ HiFi Commercial PRO HDMI Cables with IQ Control™ technology - the first fully-configurable Control Line over HDMI for any two of the following: CEC, ARC, IR, or RS-232
- Control Routing for IR/Uni-directional RS-232 via HiFi Commercial PRO HDMI Cables with IQ Control™ adds up to 8 Control ports to the control system
- Serial IR, Optical IR, Front Panel & RS-232 control
- Supports major control systems such as Compass Control®, AMX®, Control4®, Crestron®, RTI®, Universal®

Accessories

- IR Remote Control
- UL Certified Power Supply 6V/7.5A
- 16 HDMI Cable Clips, Rack Ears
- USB A to A Type Data Cable

Mounting:

- Rack mount: Secure the rack ears to each side of the KD-HD8X8 with the supplied hardware then fasten the unit to the rack rails with the included machine screws.



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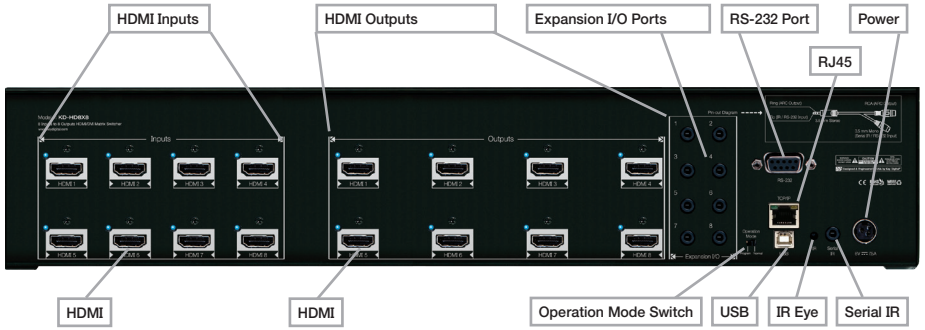
Connections, Buttons and LEDs

Rear Panel Connections:

All connections to the KD-HD8X8 are found on the rear panel of the unit. Refer to the illustrations below for port assignments while making connections



Connections

› **HDMI Inputs:** The 8 HDMI Inputs are located on the left side of the back panel. The Inputs have a blue LED that will illuminate when a source is connected and synced.

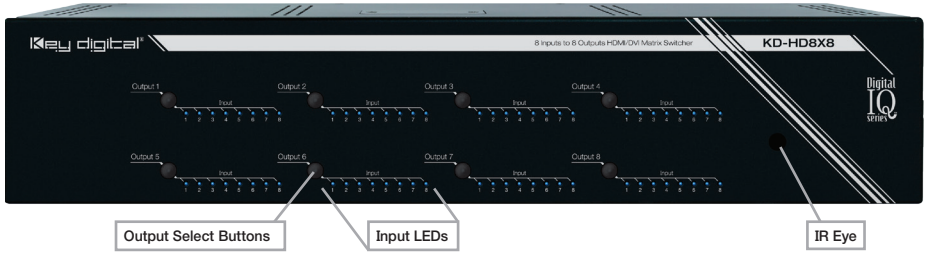
› **HDMI Outputs:** There are 8 sets of HDMI Outputs located the center of the back panel. HDMI Outputs have a blue LED that will illuminate when a display/Balun is connected and synced.

› There are 8 **Expansion I/O Ports** located on the right side of the back panel. These are standard 3.5mm stereo jacks. Connect these to any control system for routing IR/RS-232 over HDMI outputs while utilizing the Key Digital's HiFi Pro Commercial HDMI Cable. They can also be used for ARC connectivity as described later in this manual.

› The **RS-232, Serial IR, USB, TCP/IP, Optical IR Sensor, Operation Mode Switch and Power connections** are located on the right side of the back panel. The Operation Mode switch is only used to update the unit's firmware via the DB9/RS-232 port. The firmware version, as well as all RS-232 commands, is available through the RS-232 command 'H'. A detailed list of RS-232 commands is available later in this guide.

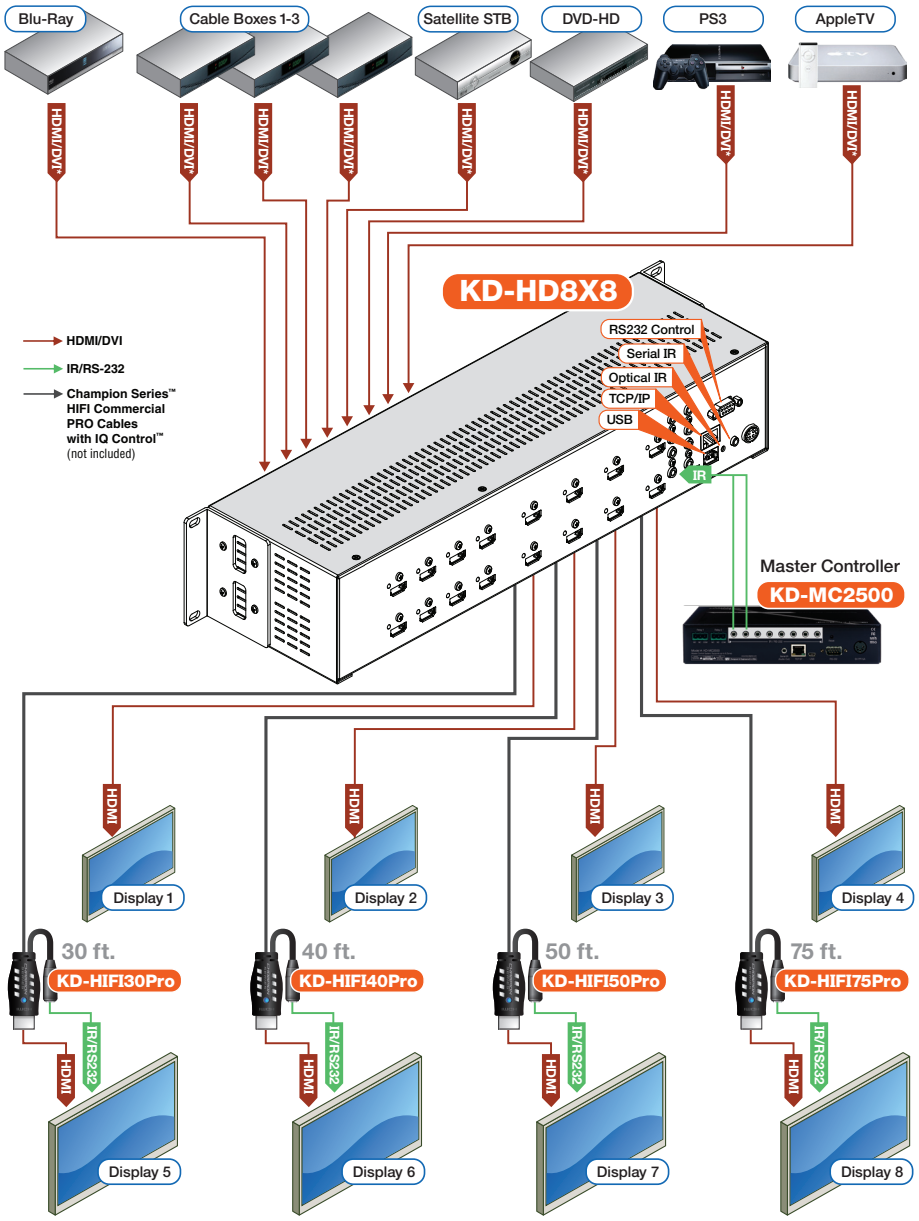
› If newer firmware is available, complete updating instructions will be included with it. Check the Key Digital website for any firmware updates.

Front Panel Buttons and LEDs:



› There are 8 Output buttons along the front panel.
› Pressing an Output button cycles through each of the 8 Inputs.
› A blue LED will indicate which Input has been selected for each Output button.
› There is also an Optical IR window located on the right side of the front panel for the remote control signals.
› Video Mute Mode for an output is represented by the illumination of Input LEDs 1,2,7,8.
› Output Off is represented by the illumination of Input LEDs 3,4,5,6.

Application Example



Quick Setup Guide

Connections

1. Begin with the KD-HD8X8 and all input/output devices turned off with power cables removed.
2. Connect HDMI sources to the appropriate input ports on the KD-HD8X8.
3. Connect display devices to the HDMI outputs.
4. Connect power to the KD-HD8X8 as well as to all other input and output devices and turn them on.
5. Operate the KD-HD8X8 switcher via front panel buttons, IR Remote, Serial IR or RS-232 control.

Operation:

After performing the setup above, the unit is ready for operation.

There are several options for controlling the unit. Commands can be issued via IR remote control, RS-232 or by using the front panel buttons. Note: the advanced commands are available only via the RS-232 protocol.

Settings

The KD-HD8X8 features a library of 12 internal EDID files, in addition to allowing an Input source to receive a copy of the EDID information of any selected Output. The default EDID setting is “01” - 1080i w/ PCM 2ch Digital Audio. Changing to different EDID settings may be necessary when connecting to or from an AV Receiver, or for passing 3D content derived from a Cable or Satellite source if the default EDID has problems. They can also speed up the switching process with cable or satellite sources.

Default Library EDID Control Table:

01	1080i Video, 2ch PCM Audio	**07**	3D/1080p Video, 2ch PCM
02	1080i Video, DTS/DOLBY Audio	**08**	3D/1080p Video, DTS/DOLBY Audio
03	1080i Video, DTS/DOLBY/HD Audio	**09**	3D/1080p Video, DTS/DOLBY/HD Audio
04	1080p Video, 2ch PCM	**10**	DVI 1280x1024 Video, No Audio
05	1080p Video, DTS/DOLBY Audio	**11**	DVI 1920x1080 Video, No Audio
06	1080p Video, DTS/DOLBY/HD Audio	**12**	DVI 1920x1200 Video, No Audio

When selecting an EDID from the library (settings 01-12), your source device will see the KD-HD8X8 EDID information instead of the display’s EDID. If your display is not capable of accepting the video resolution or audio type selected, you may not see a picture or or hear sound. In this case please choose a more compatible EDID, or use the default EDID.

EDID settings can be changed via the Device Manager software or through the RS-232 command protocol. See the RS-232 command section below for a list of EDID commands available.

Remote Control

You may control the KD-HD8X8 switching commands by using the supplied IR Remote control. There are 8 groups of controls, one group for each Output. Each Input can be selected by pressing the Input numbers 1-8. The IR remote can also be used to change EDID settings and restore the unit to a factory default state. See the full list of IR remote control commands below.

IR/Remote Control Command List

No	Command	Description
1	Power On	Power On
2	Power Off	Power Off
Video Output Setup Commands XX = [01-99], Y = [01-99]		
3	R1 ➔ XX Video Mode Mute	Set Output X to Video Mute ON
4	R1 Video Mode All Mute	Set All Output to Video Mute ON
5	R1 XX Video Mode Restore	Set Output X to Video Mute OFF
6	R1 Video Mode All Restore	Set All Output to Video Mute OFF
7	R1 XX Video Mode YY	Set Output X to Video Input Y
8	R1 Video Mode YY	Set All Output to Video Input Y
System Control Setup Commands		
EDID Setup, XX = [01-08], YY = [01-08], ZZ = [01-12]		
9	R2 XX Bass YY	Copy EDID from Output YY to Input XX
10	R2 Bass YY	Copy EDID from Output YY to All Inputs
11	R2 XX Treble ZZ	Copy EDID from Default EDID ZZ to Input XX

Default Library EDID Control Table:

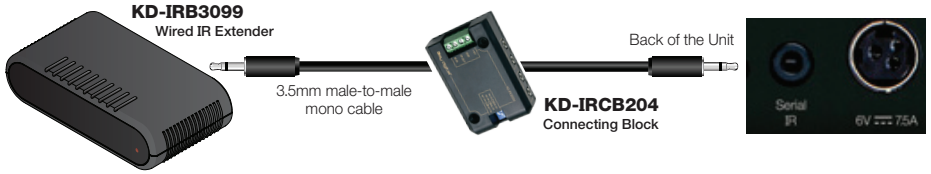
01	1080i Video, 2ch PCM Audio	**07**	3D/1080p Video, 2ch PCM
02	1080i Video, DTS/DOLBY Audio	**08**	3D/1080p Video, DTS/DOLBY Audio
03	1080i Video, DTS/DOLBY/HD Audio	**09**	3D/1080p Video, DTS/DOLBY/HD Audio
04	1080p Video, 2ch PCM	**10**	DVI 1280x1024 Video, No Audio
05	1080p Video, DTS/DOLBY Audio	**11**	DVI 1920x1080 Video, No Audio
06	1080p Video, DTS/DOLBY/HD Audio	**12**	DVI 1920x1200 Video, No Audio

EDID Setup, XX = [01-08], YY = [01-08], ZZ = [01-12]		
12	R3 XX Middle YY	Set Output (CEC) XX to Expansion Input YY
13	R3 Middle YY	Set All Output (CEC) to Expansion Input YY
14	R4 R3 R2 0 0	Set Factory Default without change EDID
15	R4 R3 R2 ZZ	Set Factory Default with update EDID ZZ=[01-12] (DEFAULT EDID 01-12)

IR Extender:

You may want to use an IR extender, such as the KD-IRKIT300. Front and Rear panel sensors are available for use with the IR extender. A wired IR serial connector is also provided at the rear of the unit.

The wired IR Extender, KD-IRB3099, included in the KD-IRKIT300 uses a 3.5mm male-to-male mono cable.



Using Device Manager

Please see the Device Manager manual.

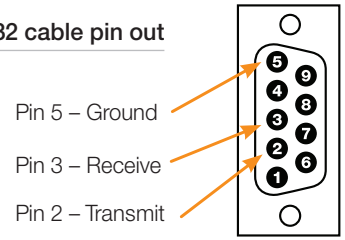
RS-232 Commands

The KD-HD8X8 provides access to all functions when used with an RS-232 control system. Key Digital provides a resource database for downloadable control modules at:
www.keydigital.com/controlmain.aspx

Connection protocol is as follows:

- Baud rate: 57,600
- Data Bits: 8
- Parity: None
- Stop Bits: 1
- Flow Control: None
- Carriage Return: Required
- Line Feed: Required

RS-232 cable pin out



For a complete list of all available RS-232 commands please see the “Downloads” section on the KD-HD8X8 product page at www.keydigital.com or use the “H” command from a terminal emulator program.

NOTE: Commands are NOT case-sensitive. Spaces are shown for clarity; commands should not have any spaces. Every command below requires a carriage return at the end of the string for the command to be executed. If a new line character is received, a prompt should be sent back.

Values for Commands:

- **H:** **Help** - Help command. List of all RS-232 commands and Firmware version.
- **STA:** **Status Command** - Displays unit status for all internal variables such as Video Input, IR Input selected for each Output, and EDID selected for each Input.
- **PN:** **Power ON** - Power ON command
- **PF:** **Power Off** - Power Off command

The status response provided by the "sta" command.

```
--                  Key Digital Systems Status                        --
--        KD-HD8x8                                F/W Version : 0.78    --
-- Power : ON                                                          --
-- Front Panel Button : Enabled                                        --
-- Control IR Source : SENSOR                                          --
--                                                                     --
-- Network Setting(Telnet Server) Status                               --
-- MAC Address = FF:FF:B1:03:00:01                                     --
-- Host IP Address = 192.168.000.118                                   --
-- Net Mask = 255.255.255.000                                          --
-- Router IP Address = 192.168.000.172                                 --
-- TCP Port = 0023                                                     --
--                                                                     --
-- Expansion I/O Status                                                --
-- 01: CEC = [ Input 01, Mask ON ], ARC = ON                           --
-- 02: CEC = [ Input 02, Mask OFF], ARC = ON                           --
-- 03: CEC = [ Input 03, Mask OFF], ARC = ON                           --
-- 04: CEC = [ Input 04, Mask OFF], ARC = ON                           --
-- 05: CEC = [ Input 05, Mask OFF], ARC = ON                           --
-- 06: CEC = [ Input 06, Mask OFF], ARC = ON                           --
-- 07: CEC = [ Input 07, Mask OFF], ARC = ON                           --
-- 08: CEC = [ Input 08, Mask OFF], ARC = ON                           --
--                                                                     --
-- Video Input Status                                                  --
-- 01: EDID = DEFAULT04, Link = ON , HDCP = ENABLED , Video = HDMI     --
-- 02: EDID = DEFAULT04, Link = ON , HDCP = ENABLED , Video = HDMI     --
-- 03: EDID = DEFAULT04, Link = ON , HDCP = ENABLED , Video = HDMI     --
-- 04: EDID = DEFAULT04, Link = ON , HDCP = ENABLED , Video = HDMI     --
-- 05: EDID = DEFAULT04, Link = ON , HDCP = ENABLED , Video = HDMI     --
-- 06: EDID = DEFAULT04, Link = ON , HDCP = ENABLED , Video = HDMI     --
-- 07: EDID = DEFAULT04, Link = ON , HDCP = DISABLED, Video = HDMI     --
-- 08: EDID = DEFAULT04, Link = ON , HDCP = ENABLED , Video = HDMI     --
--                                                                     --
-- Video Output Status                                                 --
-----------------------------------------------------------------------
-- 01: Input = 01, Display = SHP 2008, Mode = AUTO(HDMI), Output = ON  --
--     HPD = ON , Link = ON , HDCP = ENABLED , DDC = GOOD, V = UNMUTED --
-----------------------------------------------------------------------
-- 02: Input = 02, Display = SAM 2009, Mode = AUTO(HDMI), Output = ON  --
--     HPD = ON , Link = ON , HDCP = ENABLED , DDC = GOOD, V = UNMUTED --
-----------------------------------------------------------------------
-- 03: Input = 03, Display = SAM 2005, Mode = AUTO(HDMI), Output = ON  --
--     HPD = ON , Link = ON , HDCP = ENABLED , DDC = GOOD, V = UNMUTED --
-----------------------------------------------------------------------
```

The status response provides the following information:

- Firmware version
- Hardware settings
- Network settings
- Expansion port status
- Video input status (EDID, Link, HDCP, Video signal) information
- Video output status (Input selection, Display, Mode, Output enabled/disabled, HPD, Link, HDCP, DDC, Video mute) information

System Commands:

Video Switch:

- **'SP O xx SI yy'** To switch the desired Video Input to the desired Output:
  - xx = the Output number [01-08] –OR- [A] for 'All'
  - yy = the Input number [01-08] –OR- [U, D] for 'Up',' Down' respectively. 'U/D' will increase/decrease the input number from its current position.
- This command will switch Inputs to your desired Output.
- ***Example:*** To switch Input 3 to Output 1, issue the command: **'SPO01SI03'**
- ***Example:*** To incrementally switch the Input Up from its present number for Output 1, issue the command: **'SPO01SIU'**
- ***Example:*** To switch All Outputs to Input 3, issue the command: **'SPOASI03'**

IR Routing:

- **'SP O xx IR yy'** To route Serial IR/RS-232 signals
  - xx = Output numbers [01-08] –OR- [A] for 'All' Outputs
  - yy = Serial IR Input numbers [01-08] or [U, D] for 'Up',' Down' respectively. 'U/D' will increase or decrease the IR input number from its current position.
- This command will route the selected Serial IR Input number [1-8] to the desired HDMI Output.
- Example: **'SPOAIR02'**: Will carry IR from IR Input port 2 to 'All' Outputs.
  'SPO02IR01': Will carry IR from IR Input port 1 to Output 2.

EDID Copy and Default EDID Library:

- **'SP C EDID xx H/D yy':** To Copy EDID information to an Input from an HDMI Output, or from a Default Library
  - xx = Input numbers [01-08] –OR- [A] for 'All' Inputs
  - H = EDID Copy from a HDMI Output
  - D = Default EDID Library selection (see list below)
  - yy = Output numbers [01-08] when 'H or 'C' variables are selected
    –OR-
    Default EDID library settings [01-08] when 'D' variable is selected.
- This command will either copy the EDID information from a selected Output to a specific Input (or all Inputs) or, select EDID information from an internal library of default EDID settings to a specific Input (or All Inputs).
- ***Example:*** To copy the EDID information from HDMI Output 2 to Input 4, issue the command: **'SPCEDID04H02'**
- ***Example:*** To write the EDID information from the built-in default EDID library using default EDID 1 to Input 2, issue the command: **'SPCEDID02D01'**

» **Default Library EDID Control Table:**

01	1080i Video, 2ch PCM Audio	**07**	3D/1080p Video, 2ch PCM
02	1080i Video, DTS/DOLBY Audio	**08**	3D/1080p Video, DTS/DOLBY Audio
03	1080i Video, DTS/DOLBY/HD Audio	**09**	3D/1080p Video, DTS/DOLBY/HD Audio
04	1080p Video, 2ch PCM	**10**	DVI 1280x1024 Video, No Audio
05	1080p Video, DTS/DOLBY Audio	**11**	DVI 1920x1080 Video, No Audio
06	1080p Video, DTS/DOLBY/HD Audio	**12**	DVI 1920x1200 Video, No Audio

Front Panel Buttons Enabled/Disabled:

» **'SP C FB E/D'**

» Where 'E' will Enable the front panel buttons and 'D' will Disable the front panel buttons.

» ***Example:*** To Disable the front panel buttons, issue the command: **'SPCFBD'**

Reset to Factory Defaults:

» **'SP C DF xx'**

» xx = [01-12] and is the default EDID library

» This command will return the unit to its factory default settings, including a user chosen default EDID setting. (See above for a list of possible default EDID library settings available)

» ***Example:*** To reset the unit to factory default with an EDID setting of 1080i 2CH PCM, issue the command: **'SPCDF01'**

» ***Example:*** To reset the unit to factory default with an EDID setting of 3D 1080p 2CH PCM, issue the command: **'SPCDF07'**

EDID Control

EDID Control HDMI Handshaking

EDID (Extended Display Identification Data) is a data structure provided by a digital display to describe its capabilities to a video source. This data is also known as a "handshake" and typically includes manufacturer, serial number, product type, resolutions supported by the display, display size, pixel mapping data, etc.

In a one-to-one source-display system, the EDID process is relatively simple. However, HDMI matrix systems enabled by the Digital IQ Series products are far more sophisticated as a source may be selected by multiple displays–with a variety of EDID information provided–at any given time.

Key Digital EDID Control allows the integrator to choose the handshake that will be provided to each source device of the system. The EDID handshake is relayed to the source from the Digital IQ matrix, not from any of the displays/output devices of the system. This handshake will always be the EDID information that the source device receives.

EDID Control handshaking can be provided to each source independently, or to all sources simultaneously.

The EDID information is provided to a source by one of two methods:

› By copying the EDID provided by any display/output device connected via the HDMI output connection

› Providing an EDID Handshake from the Default Library

The Default Library features generic EDID handshakes that are compatible with the majority of source equipment and meet a wide-spectrum of demands in a variety of application types.

› The Default Library is subject to change as new standards and desired application updates are requested.

› The EDID Control library can be revised on your Digital IQ matrix via a firmware update. To verify the Default Library of your unit's firmware, use the RS-232 Help command ("H"). See the RS-232 Control Codes sections for more information.

Default Library EDID Control Table:

01	1080i Video, 2ch PCM Audio	**07**	3D/1080p Video, 2ch PCM
02	1080i Video, DTS/DOLBY Audio	**08**	3D/1080p Video, DTS/DOLBY Audio
03	1080i Video, DTS/DOLBY/HD Audio	**09**	3D/1080p Video, DTS/DOLBY/HD Audio
04	1080p Video, 2ch PCM	**10**	DVI 1280x1024 Video, No Audio
05	1080p Video, DTS/DOLBY Audio	**11**	DVI 1920x1080 Video, No Audio
06	1080p Video, DTS/DOLBY/HD Audio	**12**	DVI 1920x1200 Video, No Audio

› After executing EDID Control handshaking for your system, it is recommended to observe video and audio performance in all zones.

Providing a Default Library EDID handshake to a specified source:

› Via Device Manager (recommended):

» Please see the device manager manual for instructions

› Via RS-232:

» "SPCEDIDxxDyy"

» xx = input Port number or "A" (all)

» yy = default library selection (01-12)

» After giving the source device a few moments to adjust its output, you may verify the handshake has been properly received and the source has complied with the handshake by using the RS-232 Input status command "STPIxx".

› Via the Remote Control:

» See the IR Remote Control section

How to copy the EDID of a connected display/output device

› Digital IQ products are able to poll any connected output device for its EDID information and provide that EDID to the specified source.

› It is possible to poll any output device connected via the HDMI connections.

› An exact copy of the EDID file provided by the specified output device is relayed to the specified source.

- This EDID file is not stored in the Digital IQ unit's software. Therefore, it is not possible to relay the copied EDID of an output device unless it is connected at the time of prompting the handshake.
- Bear in mind that relaying an exact EDID handshake from one of the connected output devices may result in optimum performance in that respective output zone, but may also result in incompatibilities in other zones viewing that source with different display equipment.
- After executing EDID Control handshaking for your system, it is recommended to observe video and audio performance in all system zones.

How to provide a copy EDID of any connected display/output device

- Via Device Manager (recommended):
  - Please see the device manager manual for instructions
- Via RS-232:
  - "SPCEDIDxxHyy"
    - xx = input Port number or "A" (all)
    - yy = Output Port number (01-08)
    - H = output device connected via HDMI (H)
  - After giving the source device a few moments to adjust its output, you may verify the handshake has been properly received and the source has complied with the handshake by using the RS-232 Input status command "STPIxx".
- Via the Remote Control:
  - See the IR Remote Control section

Control Routing via Digital IQ™

In addition to HDMI matrix switching, Digital IQ products are able to route IR and RS-232 commands to peripheral devices. Control routing via KD-HD8x8 utilizes a proprietary IQ Control™ technology that consolidates IR or unidirectional RS-232 signals onto the head of Champion Series™ HiFi Commercial PRO HDMI Cables. The 3.5mm stereo expansion connections and IQ Control™ port are engineered to carry signals in specific directions. As a result, control routing with the KD-HD8x8 is limited to one direction–from the switch to the "display" end of the IQ Control™ HDMI cable head.

Utilizing Digital IQ's Control Routing feature significantly extends the reach of your control system–adding up to 8 control ports to your control system without requiring additional master control units.

There are two methods of Control Routing: **Port to Port** and **Masking**. It is possible to utilize both control routing methods within your Digital IQ matrix, but keep in mind that settings may interfere with each other and result in undesired control source–control destination connections.

For seamless integration that fully utilizes the Digital IQ control routing features, Key Digital's Compass Control® system is recommended. The Compass Control® RS-232 and TCP-IP Manager Databases feature individual drivers for independent IR and RS-232 matrix switching.

A look at the 3.5mm, RJ45, and Main ports and their respective number assignments utilized in control routing.

The following are required to extend control with the KD-HD8x8.

Systems without baluns:

1. A Key Digital HiFi Pro Commercial HDMI cable to connect the switch to the display that you will be controling
2. An IR emitter to transmit the control signal to the display

Systems utilizing Key Digital Baluns:

1. A Key Digital HiFi Pro Commercial HDMI cable to connect the switch to the Tx balun
2. Male-to-male 3.5mm cable
3. An IR emitter to transmit the control signal to the display

Theory: Port to Port Control Routing and Masking

Port to Port Control Routing works much like a traditional matrix switch. A control signal is transmitted into one 3.5mm expansion port and is routed to a specified HDMI output. The 3.5mm expansion ports are sources (inputs) for a control signal and the HDMI ports are outputs (destinations) for the control signal. KD-HD8X8 control routing is unidirectional. The control signal travels from the switch (source) to the display (destination). The control sources (inputs) can be connected to any 3.5mm expansion control port. A control signal is able to be sent to one or many control destinations.

Port to Port Control Routing in Brief:

- IR/RS-232 signals from a Control System to expansion ports are routed to a specified HDMI destination.
- Benefit: Control signals are consolidated onto the Champion Series™ HiFi Commercial PRO HDMI Cables with IQ Control™ technology with video and audio signals, negating the need for additional cabling to carry control signals.
- Con: Any Port to Port combination is possible, but may require many commands to establish.

Output Masking Control Routing enables a highly-customizable, large-configuration IR or RS-232 distribution block. A control signal is fed into a 3.5mm expansion port and is distributed to any number of HDMI destinations by issuing, in conjunction, the proper routing and masking commands. If commands are issued incorrectly or control connections are changed, the control signal may be disrupted.

Output Control Masking enables a control signal fed into a 3.5mm expansion port to be routed to any combination of HDMI ports.

Control Masking Routing in Brief:

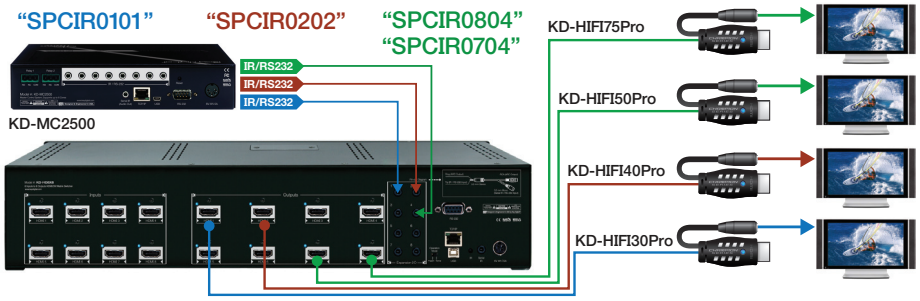
- Signals from a Control System are routed from specified 3.5 mm ports to any combination of HDMI ports
- Benefit: Any specified combinations of destinations are granted connection to the source control ports via a minimal amount of commands.
- Con: Programming can be complex, as commands featuring Hex values may need to be issued frequently depending on how dynamic the system is.

Implementing the Control Routing Features:

How to Set Port to Port Control Routing (IR & RS-232)

1. **Determine source and destination for control signal(s):**
   - **For Control Routing Systems:** "SPCIRxxyy"
     - xx = Destination (01-08 = HDMI 01-08)
     - yy = Source (01-08 = 3.5mm 01-08)
2. **Send IR/RS-232 command to be routed**
3. **(Optional) Disconnect all source-destination relationships:**
   - a. **For IR Control Routing Systems:** "SPCIRA97"
     - A = All destinations
     - 97 = Disconnect from source

A Point to Point Control Routing example with IR and RS-232 Control Routing taking place



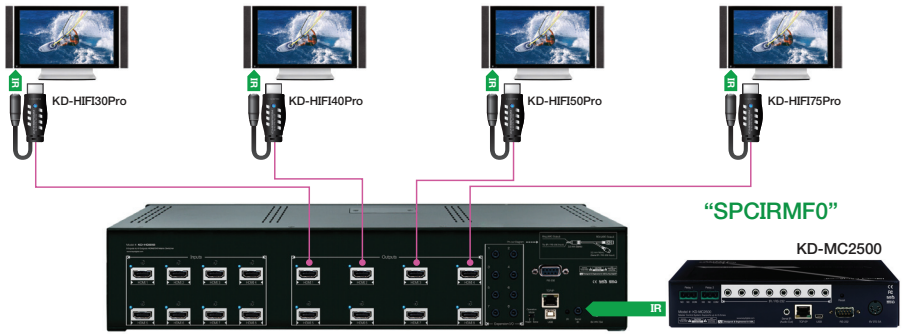
How to Set Masking Control Routing:

1. **Route a 3.5mm expansion port to HDMI output/destination ports:**
   - a. To route a 3.5mm expansion port to all HDMI output/destination ports:
     - IR/RS-232: SPCIRAyy
     - Note: this command may interrupt existing Port to Port routes in place
   - b. To avoid interruption of existing Port to Port routes, route individually:
     - IR/RS-232: SPCIRxxyy
       - xx = Destination (01-08 = HDMI01-08)
       - yy = Control signal source (01-08=3.5mm expansion port 01-08)
2. **Establish Output Mask:**
   - a. Hex Key: **0 = Connection Disabled** **1 = Connection Enabled**

Hex	Binary	Hex	Binary	Hex	Binary	Hex	Bin
0	0000	4	0100	8	1000	C	1100
1	0001	5	0101	9	1001	D	1101
2	0010	6	0110	A	1010	E	1110
3	0011	7	0111	B	1011	F	1111

   - b. Hex values for the below Output Masking commands:
     - h1 is a hex value for HDMI control destinations on 8-5
     - h2 is a hex value for HDMI control destinations on 4-1
   - c. IR/RS-232 Output Masking Command:
     - i. SPCIRMh1h2h
3. **Send IR/RS-232 command to be distributed from main control ports (output masking)**
4. **(Optional) Disconnect all destinations:**
   - a. IR/RS-232 Output Masking: SPCIRM00

A Main to Port Control Routing example in which a command is distributed to RJ45 outputs



Digital IQ Control Routing with Compass Control® System

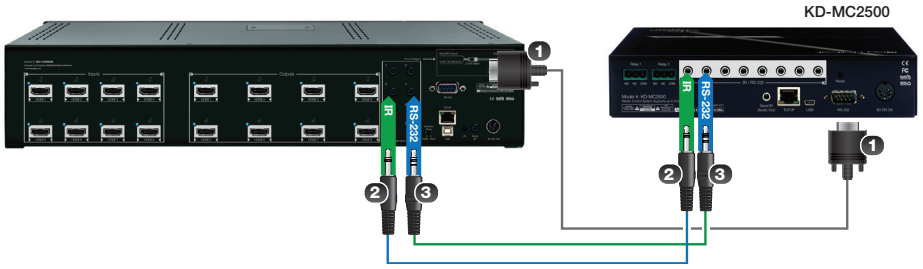
Key Digital's Compass Control® System features drivers to maximize the capability and ease of use for control routing with Digital IQ products. Each control routing matrix (IR and RS-232) features an independent driver in the Key Digital RS-232 Manager database, essentially treating each independent routing matrix as its own independent device. The drivers are named **KD-HD8X8_IR** and **KD-HD8X8_RS.**

Integrating Digital IQ with Compass Control utilizes a method of Control Routing that is a hybrid of the Port to Port and masking methods because it takes advantage of the KD-MC2500's (Compass Control Master Controller) flexible port configuring, which does not limit each port's protocol to the protocol of the assigned device. Instead, the protocol of each KD-MC2500 port is determined by the device that the control signal is intended for, allowing multiple devices to be assigned to any port. For example, a single port can issue an RS-232 command at 9600 bits per second, and then issue the next command at 57,600. It is important to ensure that proper delays have been added to the sequence.

The flexibility of the KD-MC2500 ports enables a minimal amount of connections from the master controller to the Digital IQ. Providing **three** ports from the master controller to the Digital IQ is recommended, and will provide connections to control the Digital IQ's independent matrix layers (Video, Audio, IR, RS-232), external IR devices (via control routing), and external RS-232 devices (via control routing).

Recommended connectivity between Digital IQ and KD-MC2500:

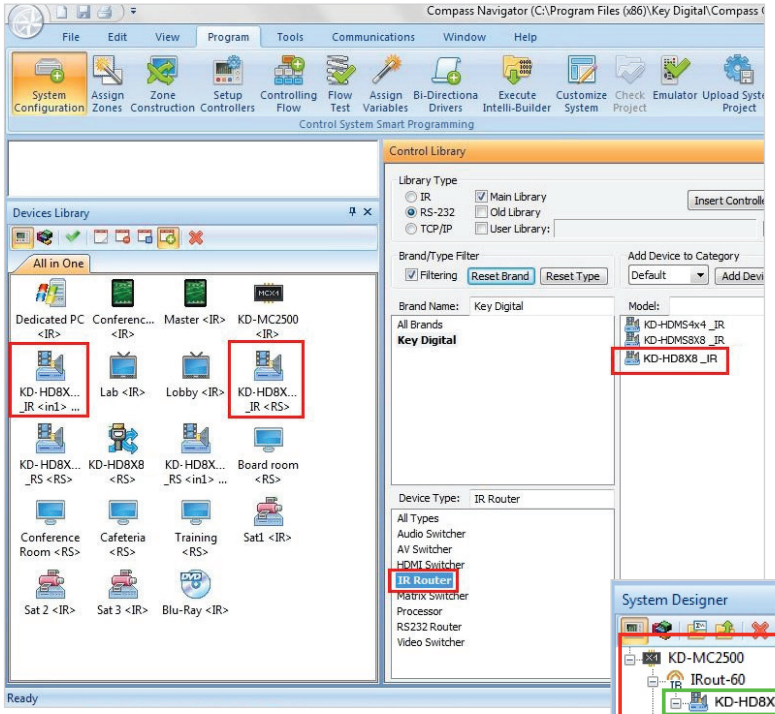
1) DB-9 to DB-9 Straight cable, providing control over the Digital IQ
2) 3.5mm Mono which will be the IR source for control routing to external IR devices
3) 3.5mm Mono which will carry the RS-232 transmit signal for control routing to external RS-232 devices



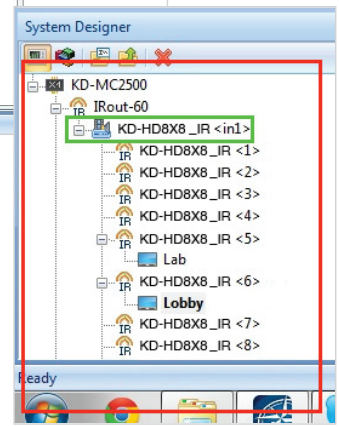
Adding the **KD-HD8X8_IR** and **KD-HD8X8_RS** to your Compass Navigator System Configuration Device Library will add two device icons:

- Adding KD-HD8X8_IR inserts "KD-HD8X8_IR <RS>" and "KD-HD8X8_IR <in1>".
  - **"KD-HD8X8_IR <RS>"** carries the RS-232 command determining IR destination and IR source matrix switching and is depicted with connection number 1 in the above diagram. In the Compass Navigator Controlling Flow Connectivity Tree, the **"KD-HD8X8_IR <RS>"** device should be connected to the Main RS-232 port of the KD-MC2500.
  - **"KD-HD8X8_IR <in1>"** is the connection that carries the IR signals intended to be routed to IR destinations. In the Compass Navigator Control Connectivity Tree, the **"KD-HD8X8_IR <in1>"** device can be connected to the or any of the eight 3.5mm multifunction ports of the KD-MC2500 (as long as the ports are pre-configured to IR) and doing so will create a tree expansion for 8 IR destinations

Brand: Key Digital → Device Type: IR Router → KD-HD8X8_IR

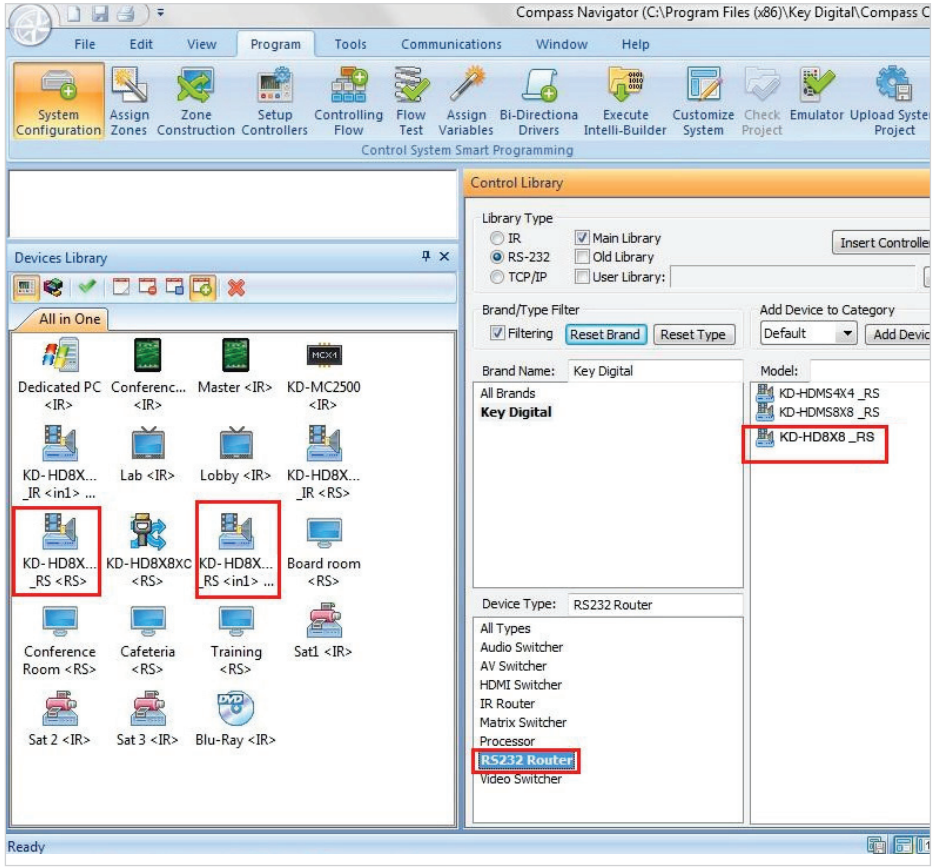


Adding "**KD-HD8X8_IR <in1>"** to the Main IR Port ("IRout-60") provides 8 additional IR connectivity points. Ports 5 and 6 (HDMI ports on Outputs 5 and 6, respectively) are routing control to the "Lab" and "Lobby" displays.

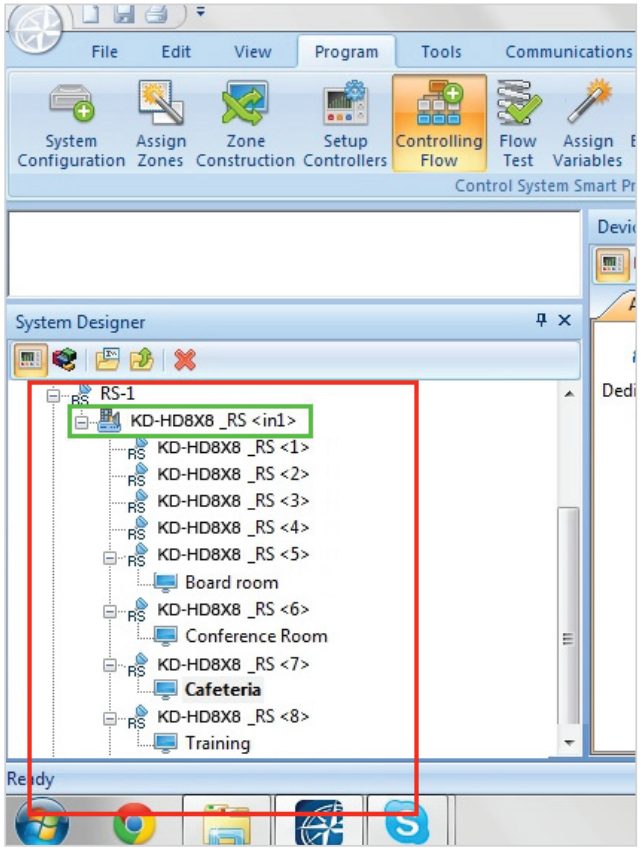


- Adding KD-HD8X8_RS inserts "KD-HD8X8_RS <RS>" and "KD-HD8X8_RS <in1>".
  - **"KD-HD8X8_RS <RS>"** carries the RS-232 command determining RS-232 destination and RS-232 source matrix switching and is depicted with connection number 1 in the above diagram. In the Compass Navigator Controlling Flow Connectivity Tree, the "**KD-HD8X8_RS <RS>"** device should be connected to the Main RS-232 port of the KD-MC2500.
  - **"KD-HD8X8_RS <in1>"** is the connection that carries the RS-232 signals intended to be routed to RS-232 destinations. In the Compass Navigator Control Connectivity Tree, the "**KD-HD8X8_RS <in1>"** device can be connected to the any of the eight 3.5mm multifunction ports of the KD-MC2500 (as long as the ports are pre-configured to RS-232) and doing so will create a tree expansion for 8 RS-232 destinations.

Brand: Key Digital → Device Type: RS232 Router → KD-HD8X8_RS



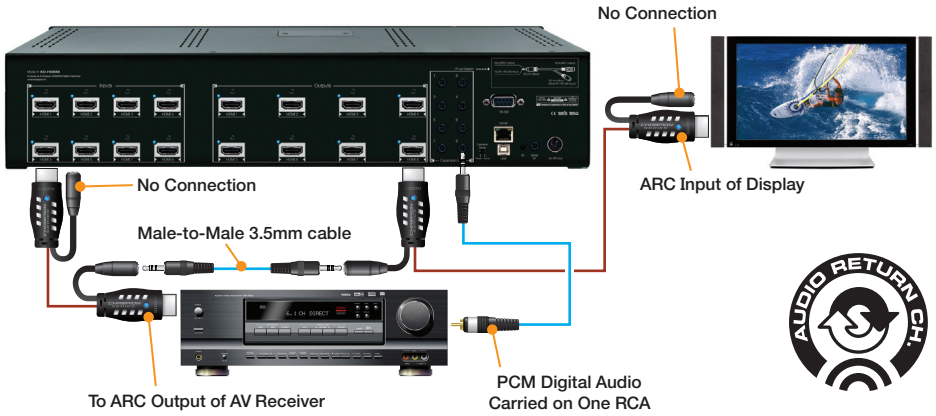
Adding "**KD-HD8X8_RS <in1>"** to the Main IR Port ("RS-1") provides 8 additional RS-232 connectivity points. Ports 5, 6, 7, and 8 (HDMI ports on Outputs 1, 2, 3, and 4, respectively) are routing control to the "Board Room" and "Conference Room", "Cafeteria", and "Training" displays.



Audio Return Channel

Audio Return Channel features rely on CEC to work effectively. CEC is not enabled through the KD-HD8x8XC matrix; therefore a CEC connection must be made elsewhere. This connection can be enabled by connecting two HiFi Pro HDMI cables together with a male to male 3.5mm stereo cable from an ARC supported TV and an ARC supported AV Receiver. The audio return channel is not output via HDMI, but instead it is sent to the corresponding 3.5mm expansion port of the output to which the ARC audio is connected to. A common 3.5mm stereo to L/R RCA Y-cable may be used to connect to your AVR, however, the audio output signal will be PCM digital and will only be carried on one of the RCA leads.

Example: An ARC compatible display is connected to output 8. The audio will be sent to 3.5mm expansion port number 8.



ARC Requirements:

- Display that supports ARC
- AV Receiver that supports ARC
- Champion Series™ HiFi Commercial PRO HDMI Cables
- Male to Male Stereo Cable
- 3.5mm to RCA cable

Specifications

Technical:

- **Input (Each):** 8 HDMI; 8 wired IR on 3.5 mm stereo jack connector per slot
- **Output (Each):** 8 HDMI
- **Bandwidth:** TMDS bandwidth 10.2 Gb/s
- **Control:** IR sensor front/rear; IR remote control, RS-232 Tx/Rx lines
- **Video/Audio Matrix Switching:** Full matrix switching for HDMI Video matrix
- **Deep Color Support:** Supports 12 Bit Deep Color
- **HDMI® and HDCP Licensing:** Fully licensed and compatible with all HDMI and HDCP technologies
- **EDID Control:** An internal EDID library featuring 12 handshakes. The ability to copy EDID information from a connected display to any number of inputs.
- **DDC Signal (Data):** Input DDC Signal: 5 Volts p-p (TTL)
- **HDMI Video/Audio Signal:** Input Video Signal: 1.2 Volts p-p
- **DDC Communication:** EDID and HDCP Bi-directional Transparency from Display to Source
- **Wired IR:** modulated IR signal input, 0-5V TTL or -10to +10V.
- **Power:** External Power Supply. 6V/7.5A

General:

- **Regulation:** CE, RoHS, WEEE
- **Rack Mount:** 1U, Full Rack Width (rack ears included)
- **Enclosure:** Black Metal
- **KD-HD8X8 Product Dimensions:** 17.3" W x 6.6" D x 3.46" H
- **KD-HD8X8 Product Weight:** 6 lb.
- **Shipping Weight:** 9 lb

Important Product Warnings

1. Connect all cables before providing power to the unit.
2. Test for proper operation before securing unit behind walls or in hard to access spaces.
3. If installing the unit into wall or mounting bracket into sheet-rock, provide proper screw support with bolts or sheet-rock anchors.

Safety Instructions

Please be sure to follow these instructions for safe operation of your unit.

1. Read and follow all instructions.
2. Heed all warnings.
3. Do not use this device near water.
4. Clean only with dry cloth.
5. Install in accordance with the manufacturer's instructions.
6. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
7. Only use attachments/accessories specified by the manufacturer.
8. Refer all servicing to qualified service personnel. Servicing is required when the device has been damaged in any way including:
   - Damage to the power supply or power plug
   - Exposure to rain or moisture

Power Supply Use

You MUST use the Power Supply provided with your unit or you VOID the Key Digital® Warranty and risk damage to your unit and associated equipment.

How to Contact Key Digital®

System Design Group (SDG)

For system design questions please contact us at:

- Phone: 914-667-9700
- E-mail: sdg@keydigital.com

Key Digital Trainings

For questions about Key Digital® Trainings please contact us at:

- Phone: 914-667-9700
- E-mail: training@keydigital.com

Customer Support

For customer support questions please contact us at:

- Phone: 914-667-9700
- E-mail: customersupport@keydigital.com

Technical Support

For technical questions about using Key Digital® products, please contact us at:

- Phone: 914-667-9700
- E-mail: tech@keydigital.com

Marketing and Public Relations:

For marketing and public relations information, please contact us at:

- Phone: 914-667-9700
- E-mail: marketing@keydigital.com

Repairs and Warranty Service

Should your product require warranty service or repair, please obtain a Key Digital® Return Material Authorization (RMA) number by contacting us at:

- Phone: 914-667-9700
- E-mail: rma@keydigital.com

Feedback

Please email any comments/questions about the manual to:

- E-mail: customersupport@keydigital.com

Warranty Information

All Key Digital® products are built to high manufacturing standards and should provide years of trouble-free operation. They are backed by a limited two-year parts and labor warranty.